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A Fabry-Perot Study of the Scd I galaxy NGC 5457

Ivânio Puerari & Margarita Valdez-Gutiérrez

INAOE, Calle Luis Enrique Erro No. 1, Sta. María Tonantzintla, 72840, México

Margarita Rosado

IA-UNAM, Apartado Postal 70 - 264 Ciudad Universitaria, México D.F., 04510, México

Abstract. We have analyzed Hα Fabry-Perot interferograms of NGC 5457 (M101) in order to calculate the rotation curve. We have also isolated a sample of 263 HII regions and we determined for each one its radial velocity and velocity dispersion. The rotation curve agrees with previous determinations and the mass derived from it is $9.8\times\ 10^{10}$ $M_{\odot}$. The distribution of velocity dispersion values of the HII regions presents a normal behavior, with a mean value of 30 km sec^{-1}.

1. Introduction

The study of the kinematics of spiral galaxies is an active area of astronomical research. The construction of Fabry-Perot interferometers have greatly increased the kinematical knowledge of these objects. In this contribution, we present preliminary results from a Fabry-Perot study of NGC 5457 (M101).

2. Data and Reduction

The observations were carried out during the night of July 23-24, 2001, with the UNAM Scanning Fabry-Perot interferometer (SFPI) PUMA attached to the f/7.9 Ritchey-Chretien focus of the 2.1m telescope at the Observatorio Astronómico Nacional at San Pedro Mártir, B.C., México. The main characteristics of PUMA can be found in Rosado et al. (1995). The data reduction was performed using the ADHOC package (Boulesteix 1993). The reduction procedure followed a "standard" scheme and the details will be published elsewhere (Puerari et al., in preparation).

3. Results

One of the main results obtained from Fabry-Perot data is the radial velocity field. By using this field, and the geometrical parameters of the galaxy (inclination and position angles, kinematical center) as well as the recession velocity, the rotation curve can be calculated. For NGC 5457, we have derived the rotation

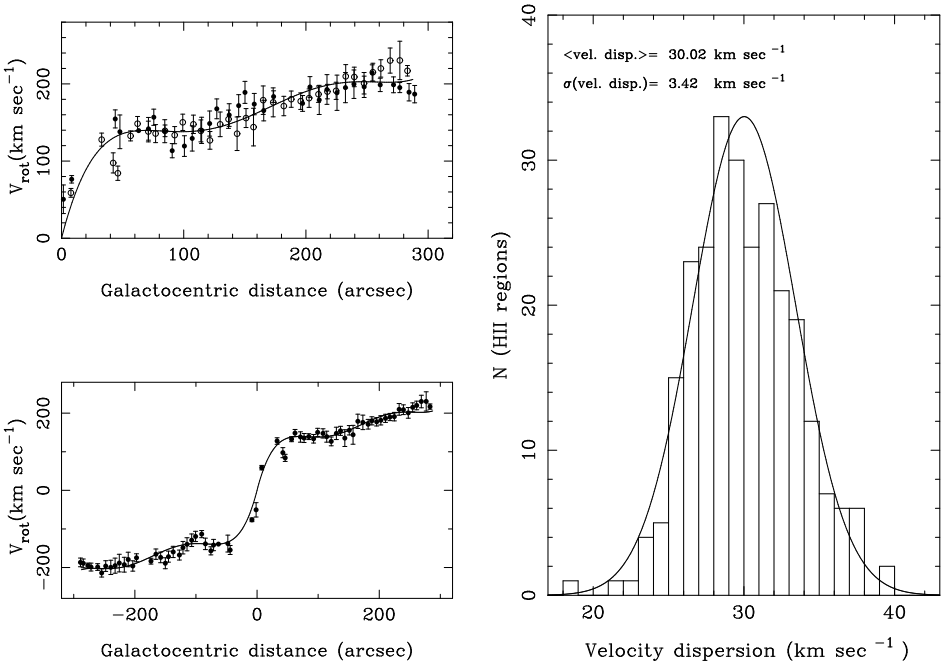

Figure 1. Upper left: The total rotation curve derived from the radial velocity field. Bottom left: The rotation curve plotted without "folding" (the solid line is just a 7 order "polygonal" fit). Right: The distribution of HII regions velocity dispersion values. The solid line is a gaussian fit (the values of the gaussian are given up to the left).

curve presented in Fig. 1 (left panels). This curve is in agreement with that one of Comte et al. (1979, see their Fig. 6), but our results present less dispersion, due to the better resolution and signal/noise ratio of our observations. Assuming a distance of 7.2 Mpc (Sandage & Tammann 1974), we have calculated a total mass of $9.8\times\ 10^{10}$ $M_{\odot}$ inside a radius of $4\farcm8$ (or 10 kpc), also in agreement with Comte et al. (1979).

We have also obtained the velocity dispersion of the HII region population. We fitted a gaussian to each HII region velocity profile and corrected the final value by the instrumental, thermal and intrinsic broadenings. The distribution of velocity dispersion values presents a normal behavior (see Fig. 1, right panel). The mean value of this distribution is 30 km sec^{-1} (i.e., supersonic dispersion); this result must be checked with Fabry-Perot studies at other lines (eg., [SII]).

References

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